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Depression among the ageing population of Ghana: The risk factors

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ABSTRACT

Background: The occurrence of challenges associated with the health of the aged keeps increasing due to the increasing aged population. One of the most common among these is depression. Depression is a prevalent mental illness that is defined by prolonged melancholy, loss of interest in once-enjoyed pursuits, and the inability to carry out everyday tasks for at least two weeks. The study analyzed the contributing factors associated with depression among the ageing population of Ghana.

Method: The study used the World Health Organization's Study on global AGEing and adult health (SAGE) wave 1 data from Ghana. There were 4,223 participants in the data. Descriptive statistics and logistic regression were used for data analysis. A logistic regression model was developed using the data.

Results: The findings indicated that 52.76% of the elderly suffered depression. The prevalence of depression is higher among older adults with severe or moderate vision issues. Additionally, it was shown that those with medium levels of education experience depression more frequently than those with no education or low levels of education. Again, older people with memory problems are more prone to depression. The logistic regression found difficulty in seeing, highest education level, systolic blood pressure, alcohol intake, and difficulty in remembering as the risk factors associated with depression.

Conclusions: The prevalence of depression among the aged in Ghana is high. Since depressive symptoms are frequently linked to aging, we advise health practitioners to screen depressive symptoms alongside other chronic medical conditions in the elderly population in healthcare facilities and community settings.

Keywords: depression, logistic, ageing, regression, Ghana

INTRODUCTION

Depression is a prevalent mental illness that is defined by prolonged melancholy, loss of interest in once-enjoyed pursuits, and the inability to carry out everyday tasks for at least two weeks. Additionally, individuals with depression frequently experience several of the following: a decrease in energy, a change in appetite, increased or decreased sleep, anxiety, attention problems, difficulty making decisions, restlessness, and depressive or suicidal thoughts [1-2]. The global, annual, and lifetime prevalence of depression are 12.9%, 7.2%, and 10.8%, respectively [3-4]. The average total cost of patients with depression is US$7,638 per patient per year and indirect costs (e.g., unemployment and loss of productivity) dominated the total costs [5]. People with depression suffer from impairment of all major areas of functioning and die prematurely [6].

The ageing population keeps rising in the world specifically in most developing countries. According to the World Health Organization (WHO), there are over 40 million aged estimated to have challenges in remembering, reasoning or difficulty in making decisions that pertains to their daily life around the world. Among this high numbers, approximately six out of every ten of these people are in developing countries. The WHO anticipate these numbers to rising to over 70 million by 2030. In 2050, this figure is estimated to hit more than 130 million [1, 7]. The population of Ghana is not different when it comes to ageing. The ageing population of Ghana (60 years and above) was 4.1% 1950, 4.5% in 1975, 5.2% in 2000. It is estimated that it will rise to 7.2% in 2025 and 11.9% in 2050 [8, 9].

Depression can affect individuals from all walks of life, and those who have endured experiences such as abuse, significant losses, or other sources of stress are more susceptible to developing depression [10]. An estimated 3.8% of the world population is affected by depression, which includes 5% of adults, with 4% among men and 6% among women, as well as 5.7% of adults over the age of 60. Approximately 280 million people in the world have depression [11, 12]. The occurrence of challenges associated with the health of the aged keeps increasing due to the increasing aged population. One of the most common among these is depression. The need to

understand the problem of depression among elderly requires attention from all groups of the community. This research focused especially on depression among elderly people living in Ghana.

METHOD

Study Participants and Data Source

Data for this study were drawn from wave 1 data of the WHO's Study on global AGEing and adult health (SAGE) survey collected in Ghana from January 2007 to December 2008 by the WHO. A longitudinal survey under the banner of SAGE was conducted in 2007 in six countries (China, Ghana, India, Mexico, the Romanian Federation, and South Africa) by the WHO regarding adults eighteen years and above. The survey conducted on a sample of Ghanaian households employed a stratified multistage cluster sampling approach. First, a sampling method was used based on administrative division (using all ten regions in Ghana) and nature of locale (urban or rural), generating twenty strata. Approximately 235 enumeration areas were selected as primary sampling units from these localities out of which 5,259 households were surveyed. A total of 5,573 (males = 2,799 and females = 2,764) respondents were then sampled from these households. Response rates at both household and individual levels were 86% and 80%, respectively. The data contain variables that enable the pursuance of this study, including variables on psychosocial factors, anthropometric factors, and sociodemographic characteristics. The study used 4,223 participants aged 50 years and above.

The study focused on depression and hence that was considered the primary outcome variable of the developed model. Individuals who provided consent in the selected households were asked if they have been diagnosed with depression with response been yes (1) and no (0). Furthermore, participants were inquired about the extent to which they experienced feelings of sadness, low spirits, or depression over the past 30 days. The responses were none, mild, moderate, severe, and extreme. For this study, depression was measured as categorical variable using the second question with responses none (0) and all others (mild, moderate, severe, and extreme) (1). Other variables considered include sex, difficulty in remembering, difficulty in seeing, systolic blood pressure (SBP), and alcohol intake.

Statistical Analysis

Let $y = [y_1, y_2, \ldots, y_m]$, $y \in (0, 1)$, $i = 1, 2, \ldots, m$ with $y_i = 1$ denoting the ith individual is depressed and $y_i = 0$ denoting ith patient non- depressed. Also, let $X_p = [X_1, X_2, \ldots, X_p]$ and $X_j = [X_{1j}, X_{2j}, \ldots, X_{pj}]$, where $j = 1, 2, \ldots, p$ represent a p-dimensional covariate (predictor) vector predicting y. We also write $X = [1, X_p]$, where 1 denotes an m column vector of 1's for a $m \times (p + 1)$ design matrix, where we have written a' as the transpose of the vector a. Write the success and failure probabilities as $p(y_i = 1) = \eta$, and $p(y_i = 0) = 1\text{-}\eta$, respectively. Then, the generative model for y_i is assumed to follow the Bernoulli probability model:

$$p(y_i|\eta) = \eta^{y_i}(1-\eta)^{1-y_i}, 0 < \eta < 1. \quad (1)$$

We further model the set of predictors, X_p via a logit link function:

$$\log(\frac{\eta}{1-\eta}) = X_i'\beta, \quad (2)$$

where $X = [1, x_{i1}, x_{i2}, \ldots, x_{ip}]$, $\eta = \frac{e^{X_i'\beta}}{1+e^{X_i'\beta}}$, $1-\eta = (1+e^{X_i'\beta})^{-1}$, $\beta = [\beta_0, \beta_1, \ldots, \beta_p]$ is a set of regression coefficients associated with the predictors. This model we fitted is similar to the logistic regression model employed in the work of [13, 14].

The likelihood ratio test of the hypothesis H_0: $c(\beta) = 0$ was used to assess the overall goodness of fit [13]. Here, we compared the likelihood that a respondent is depressed to the likelihood that he or she is not depressed. The deviance and Hosmer-Lemeshow (HL) test was used to measure the fit of model shown in Eq. (2.) The HL test tells whether the observed event rate matches that of the expected event rate in a given subgroup [15]. It is given by Eq. (3):

$$G_{HL}^2 = \sum_{l=1}^{10} \frac{(o_i-e_i)^2}{e_i(1-\frac{e_i}{n_i})} \sim \chi_8^2. \quad (3)$$

RESULTS

Background and Chi-Square Test

From **Table 1**, 52.76% of 4223 aged participants had depression. Which shows that five out of every ten aged participants had a depression. In addition, 70.35% of aged people with severe seeing difficulty had depression exceeding those aged people with no seeing difficulty by 35.4%. Aged

Table 1. Cross tabulation of depression status against some selected variables (N, [%])

	Depression status			Chi-square	p-value	Crude OR
	No	Yes	Total			
Total	1995 (47.2)	2228 (52.8)	4223			
Difficulty in seeing				1312.1	0.000	
None	918 (21.7)	493 (11.7)	1411 (33.4)			
Moderate	945 (22.8)	1422 (33.7)	2367 (56.1)			2.80
Severe	132 (3.1)	313 (7.4)	445 (10.5)			4.41
Sex				18.6	0.000	
Male	1114 (26.3)	1096 (26.0)	2210 (52.3)			
Female	881 (20.9)	1132 (26.8)	2013 (47.7)			1.31
High blood pressure				115.0	0.000	
No	783 (18.5)	980 (23.2)	1763 (41.7)			
Yes	1212 (28.7)	1248 (29.6)	2460(58.3)			0.82
Difficulty in remembering				1522.0	0.000	
None	1100 (26.0)	465 (11.0)	1565 (37.1)			
Moderate	808 (19.1)	1547 (36.6)	2355 (55.8)			4.53

Table 1 (Continued). Cross tabulation of depression status against some selected variables (N, [%])

	Depression status			Chi-square	p-value	Crude OR
	No	Yes	Total			
Severe	87 (2.1)	216 (71.3)	303 (7.2)			5.87
Alcohol intake				123.8	0.000	
No	839 (47.9)	911 (52.1)	1750 (41.4)			
Yes	1156 (46.7)	1317 (53.3)	2473 (58.6)			1.05
Tobacco intake				978.8	0.000	
No	839 (47.9)	911 (52.1)	1750 (41.4)			
Yes	1156 (46.7)	1317 (53.3)	2473 (58.6)			0.86
Age				26.7	0.000	
50-69 years	1424 (33.7)	1424 (33.7)	2848 (67.4)			
70 and above	571 (13.5)	804 (19.0)	1375 (32.6)			1.41

Table 2. Parameter estimates for the logistic regression model

Variables		Estimate	Standard error	Wald Chi-square	p value	AOR	95% CI OR
(Intercept)		-1.0457	.1050	99.233	.0000		
Difficulty in seeing	Moderate	.7901	.0763	107.354	.0000	2.204	[1.898-2.559]
	Severe	1.055	.1284	67.576	.0000	2.872	[2.234-3.694]
Sex	Female	.1141	.0748	2.323	.1275	1.121	[0.968-1.298]
High blood pressure	Yes	-.2612	.0690	14.332	.0002	0.770	[0.673-0.882]
Difficulty in remembering	Moderate	1.3212	.0739	319.810	.0000	3.748	[3.243-4.332]
	Severe	1.6030	.1449	122.459	.0000	4.968	[3.740-6.599]
Tobacco intake	Yes	-.2082	.0838	6.170	.0130	0.812	[0.689-0.957]
Body mass index (18.3-25.0)	No	0.0665	0.0685	0.942	.332	1.069	[0.938-1.222]

Table 3. Model fitting information and goodness of fit test

Model/test	-2 log likelihood	Chi-square	df	p-value
Null	5,841.5			
Final	5,146.1	695.3	8	.0000
HL		14.15	8	.1077

females having depression (56.2%) exceed that of aged males (49.6%). Aged people who have tertiary education level are more depressed (57.3%) compared with other groups. Greater percentage of the aged participant with depression also have some challenge with remembering (71.3% for severe and 65.7 for moderate). The study also shows that aged people who take alcohol are slightly less depressed (52.1%) than those who do not take alcohol (53.3%).

Logistic Regression Model

The Pearson Chi-square presented in **Table 2** showed a significant association between the depression in aged and the variables (difficulty in seeing, gender, difficulty in remembering, highest education level,) at the 1% significant level ($p < 0.001$).

From **Table 2** of the model output, difficulty in seeing, highest education level and difficulty in remembering are factors that significantly affect depression status of aged people.

In **Table 3**, the odds that aged people with sever seeing difficulty are depressed was 2.703 (odds ratio [OR] = 2.703, confidence interval [CI] : 2.115 - 3.467, p = 0.000) times of aged people with no difficulty in seeing. Again, the chance that aged people with moderate seeing difficulty being depressed was 2.129 (OR = 2.129, CI: 1.836 - 2.470, p = 0.000) higher compared with the reference category. The study revealed that aged people with nil (OR = 1.956, CI: 1.348 - 2.868, p = 0.0005) and basic (OR = 1.867, CI: 1.236 – 2.847, p = 0.0033) education levels had higher chance of being depressed compared with the aged people who had no education. The study also showed that aged people having moderate (OR = 3.625, CI: 3.138 - 4.192, p = 0.000) and sever (OR = 4.761, CI: 3.598 - 6.343, p = 0.000) remembering difficulty were more likely to become depressed compared with aged people who had no remembering difficulty.

According to **Table 3**, there is a significant improvement in fit in the final model as compared to the null model [χ^2 (8) = 695.3, $p < 0.0001$]. The HL test [χ^2 (8) = 14.15, $p < 0.1077$] attest how good the model fit the data.

DISCUSSION

In underdeveloped nations, depression poses a serious public health threat. Depression has historically been linked to ageing. The older people have a much higher risk of depression as compared to the general population. This study determined the contributing factors associated with depression among the aged population in Ghana. In this study, the prevalence of depression among older people was 52.76%. The finding was in line with a study conducted in India (52.5%) [16, 17]. The prevalence of depression found in this study was higher than the result from studies conducted in Nepal (47.3%) [18, 19], rural Nigeria (43.5%) [20, 21] and Egypt (45.7%) [22-24]. Also, the study in [25] found the prevalence of depression to be 19.6% among hypertensive patients in the Kingdom of Saudi Arabia. The study in [26] found the prevalence of depression among hypertensive patients to be 26.8%.

In this study, difficulty in seeing was found to be a contributing factor to old age depression and it confirms the result of the studies in [25-27]. The other covariate that is highly significant to old age depression is remembering difficulty, aged people with moderate and severe remembering difficulty are more depressed than those with no remembering difficulty which agrees with the result of the studies in [28, 29]. Education level was also found to be a major risk factor for old age depression. This has also been found in many aging studies [28,

30-32]. Depression has some association with high blood pressure [33]. The current study found that depression was not a significant risk factor for depression. This result contradicts some studies we came across. According to the WHO, depression is approximately 50% more prevalent in women as compared to men [34]. Women exhibit a higher propensity to experience a greater quantity and intensity of stressful life events, including those influenced by genetic, biological, and environmental variables, in comparison to men [28, 35, 36].

There is an established base-line association between depression and high blood pressure. High blood pressure is defined as SBP of 130 or higher [37]. In our logistic regression model, SBP was found to be a risk factor for depression. This finding confirms the reports from some studies. It was found that depression was common among uncontrolled hypertensive patients, which was approximately nine times that of the general population [38]. They found a high prevalence of depression in hypertensive patients; this prevalence was approximately nine times greater than what is observed in the general population. A recent study in [39] continues to show this association between depression and high blood pressure. High SBP can affect a better mental health and ultimately contribute to the development of depression.

The study also found that alcohol intake is a risk factor for depression. Vallée found similar results and asserted that excessive drinking alcohol is associated with higher SBP, DBP, depression and hypertension among middle age population [40]. Although depression and high blood pressure have been linked with old age yet certain lifestyles like alcohol drinking, taking of tobacco products as well as lack of exercise have been linked to depression. As a result, the study in [41] instigate that certain lifestyle interventions can significantly reduce the risk of developing depression including reducing salt intake, alcohol intake as well as smoking. According to the National Institute on Ageing, high SBP which is associated with high blood pressure can be managed effectively through lifestyle adjustments and medication in order to hinder its health complications, which may encompass cardiovascular conditions, dementia, vision issues, and depression [37].

CONCLUSIONS

In this study, depression affects more than half of the elderly population of Ghana. Education level, alcohol intake, SBP, difficulty in remembering, and seeing difficulty are risk factors that have been strongly linked to depression. As a result, since depressive symptoms are frequently linked to aging, we advise health practitioners to screen depressive symptoms alongside other chronic medical conditions in the elderly population in healthcare facilities and through community settings. It is preferable to place more emphasis on the risk categories that this result indicates.

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AI statement: The authors stated that no generative AI was used in developing the manuscript

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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